## MANUFACTURER'S TIME-SHARING SYSTEMS

The following manufacturers offer interactive time-sharing software with the models indicated.

| MANUFACTURER | MODEL | WORD SIZE (Bits) | ADD TIME IN $\mu$-SEC. | ON-LINE LANGUAGES | FIRST DELIVERY |
|---|---|---|---|---|---|
| Control Data Corp. | 3300/3500 | 24 | 2.5/1.6 | FORTRAN COBOL | 6/66 |
| Digital Equipment Corp. | PDP-6 | 36 | 4.4 | MACRO-6 FORTRAN | 10/64 |
| General Electric Co. | 235 | 20 | 12 | BASIC ALGOL | 6/65 |
| General Electric Co. | 645 | 36 | 1.8 | | 3/66 |
| International Business Machines | System/360 Model 67 | 32 | 1.3 | PL/I FORTRAN | 9/67 |
| Scientific Data Systems | 940 | 24 | 3.5 | FORTRAN CAL, LISP SNOBOL | 4/66 |

## COMMERCIAL TIME-SHARING SYSTEMS

Users can purchase remote, on-line and interactive computer services from the organizations listed below.

| ORGANIZATION | COMPUTER | LANGUAGES | TERMINALS | NO. OF USERS | COST/HR.* |
|---|---|---|---|---|---|
| Charles W. Adams Assoc. Keydata System Cambridge, Mass. | UNIVAC 491 | KOP-III | TT-28 | 16 | Dependent on[15] User Program |
| Applied Logic Corp. Tele-Computing Service Princeton, New Jersey | DEC PDP-6 | FORTRAN IV [16] MACRO-6 | TT-33 CRT | 20 | $5.00 plus $360/Hr. for Processor Time |
| Bolt, Beranek and Newman Inc. TELCOMP Service Cambridge, Mass. | DEC PDP-1 | TELCOMP | TT-33 | 16 | $12.50 |
| CEIR Inc. Arlington, Virginia | GE 235 DATANET-30 | BASIC | TT-33 | 30 | $5.00 |
| General Electric Co.[17] New York, N. Y. | GE 235 DATANET-30 | BASIC [18] ALGOL | TT-33 | 30 | $12.00 [19] |
| International Business Machines QUIKTRAN Service New York, N. Y. | IBM 7044 | QUIKTRAN | IBM 1050 | 40 | $12.00 |

\* Calculated on the basis of 50 hours usage per month.

15. For accounting and management information uses. Charges on basis of message transmissions, processor time and storage used.
16. Other on-line languages under development.
17. Additional systems to be located in Phoenix, Washington, D.C., and Schenectady.
18. FORTRAN to be available in February, 1966.
19. Processor time charged at $180/hr after first 2 hrs.

### A WORD ABOUT COMPUTER RESEARCH CORPORATION

Computer Research Corporation provides consulting, research, engineering and programming services leading to the effective use of computers as problem solving tools. As specialists in the man-machine partnership, we strive to make men more productive as they pursue intellectual and administrative activities.

# COMPUTER RESEARCH CORPORATION

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# TIME-SHARING SYSTEM SCORECARD

## A SURVEY OF ON-LINE MULTIPLE USER COMPUTER SYSTEMS

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This guide has been prepared to keep the reader abreast of the rapidly increasing number of time-shared computer systems which are bringing man and machine together in close partnership for the pursuit of intellectual and administrative activities. By glancing at the following three charts the reader can judge for himself the progress which is being made in this new and dynamic field. There are several different definitions of time-sharing. No single definition is adequate for all purposes. We have limited this survey to systems which have at least two independent, remote and simultaneously operable consoles (from the user's point of view). If the language capabilities of the system are extensive and general so that a user can create new languages while working on-line, we have denoted this as a general purpose time-sharing system. Where the language capabilities are more restrictive, permitting the user to work in only one specific problem area, we have used the term special purpose time-sharing system.

In the past six months, a number of manufacturers have announced new computer systems which are designed specifically to accommodate time-sharing use. These have been tabulated in a separate chart for the reader's convenience. In a third chart, we have listed six commercial time-sharing service bureaus that are now in operation. These are the first of many organizations that are expected to enter this new industry within the next several months. While some of these will operate on a local basis, such as the Tymshare Corp. which plans to service San Francisco, and Allen-Babcock Computing which plans to service Los Angeles with an IBM Model 50, the larger companies have more ambitious goals. Western Union has plans for a national communications network linking a series of time-shared computers. Although message switching will be the first application, WU intends to use the system for other types of information processing. By 1970, they estimate that 40,000 subscribers will have access to their information utility.

### CHARACTERISTICS LISTED IN CHARTS

**STATUS** — O-operational system, number in parentheses denotes the approximate date that the system went on the air. D-system under development with anticipated date that operations will begin.

**TYPE** — G-general purpose, S-special purpose.

**COMPUTER** — manufacturer's name and number of central computers in system.

**LANGUAGES** — basic languages available on system at present.

**TERMINALS** — type of terminal equipment available, number of such terminals in parentheses. Code: TT followed by number denotes TELETYPE terminals and model number, TY-typewriter, TLX-Telex console, CRT-cathode ray tube display, BR-Bunker Ramo series 200 display consoles, IBM 1050-keyboard consoles, PHILCO-display consoles.

**MAIN STORAGE** — first number denotes total core storage in words on system, second number in parentheses, if given, denotes maximum core storage available to an individual user.

**SECONDARY STORAGE** — DR-magnetic drum, DK-disk file, MT-magnetic tape (K = 1024, M = 1,000,000).

**NO. OF USERS** — maximum number of users who can operate simultaneously at any given time.

# RESEARCH ORIENTED TIME-SHARING SYSTEMS

Prepared by COMPUTER RESEARCH CORPORATION

| ORGANIZATION | STATUS | TYPE | COMPUTER(S) | LANGUAGE(S) | TERMINALS | MAIN STORAGE | SECONDARY STORAGE | NO. OF USERS | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| Bell Telephone Laboratories [1] Murray Hill, New Jersey | D (12/66) | G | GE-645 [2] | FORTRAN IV COBOL, PL/I SNOBOL | TT-37 IBM 1050 CRT (10) | 256K | DK (40M Wds.) DR ( 4M Wds.) Tape Loop (100M Wds.) | 100 | Highly interactive system for research and production computing |
| Bolt, Beranek and Newman Inc. [3] Cambridge, Mass. | O (6/64) | G | PDP-1D [4] | MIDAS TELCOMP [5] | TT-33 (48) | 24K (4K) | DR (128K Wds.) DR (25M Wds.) MT (2 Units) | 48 | Medical Information and communications system for hospitals |
| Carnegie Institute of Technology Pittsburgh, Penn. | O (3/65) | G | 2 G-20 | ALGOL | TT-33 (12) | | DR | 12 | |
| Dartmouth College [6] Hanover, N. H. | O (5/64) | G | GE 235 DATANET-30 | BASIC ALGOL | TT-35 (37) | 32K (6K) | DK (6M Wds.) MT (8 Units) | 27 | Educational time-sharing system |
| MIT Computation Center Cambridge, Mass. | O (11/61) | G | IBM-7094 | Same as Project MAC Phase one | | 64K (32K) | DK DR MT | 24 | |
| MIT Computation Center Cambridge, Mass. | D (1/67) | G | IBM 360 [2] 2 Model 67 | | | 256K | DK (52M Wds.) | 200 | |
| MIT Dept. of Civil Eng. ICES SYSTEM Cambridge, Mass. | D (12/66) | S | IBM 360 Model 40 | ICETRAN STRESS COGO | IBM 2741 (5) IBM 2250 | 32K | 3 DK (1.8M Wds.) | | Integrated system for civil engineering problems |
| MIT Dept. of Electrical Eng. Cambridge, Mass. | O (5/63) | G | PDP-1 | Macro Assembler | TY (4) | 12K | DR (88K Wds.) | 4 | Experimental time-sharing system for student use in thesis and research projects |
| Ohio State University Columbus, Ohio | D (9/66) | G | GE-645 [2] | | TT (15) CRT (8) | 64K | DK | 23 | |
| Perkin Elmer Corp. Norwalk, Conn. | D (12/65) | G | SDS-9300 SDS-930 | FORTRAN IV | TT, TY TWX | 32K | | 16 | |
| Project MAC — MIT (Phase One) Cambridge, Mass. | O (10/63) [7] | G | IBM-7094 | ALGOL [8] FORTRAN MAD LISP | TT-35 (54) IBM-1050 (56) TLX (1) TWX PRIME (3) CRT (2) | 64K (32K) | DK (36M Wds.) DR (.5M Wds.) MT (12 Units) | 30 | Project MAC is an MIT research program sponsored by the Advanced Research Projects Agency, D.O.D., under a contract with the Office of Naval Research |
| Project MAC — MIT (Phase Two) Cambridge, Mass. | D (9/66) | G | GE-645 [2] | | TT-37 [9] | 128K | DK DR (4M Wds.) MT (8 Units) | 150 [9] | Expected to be capable of limited demonstration in Fall, 1966 and in normal operation by January 1967 |
| RAND Corporation Santa Monica, California | O (5/63) | S | Johnniac [10] | JOSS | TY (10) | 4K | DR (12K Wds.) | 8 | Interpretive system with compact conversational language for small numerical problems |
| Rensselaer Polytechnic Institute Troy, N. Y. | D (8/66) | G | IBM 360 Model 50 | FORTRAN | TT-33 (16) | 64K | 3DK (1.8M Wds.) MT (4 Units) Core (256K Wds.) | 16 | For education, language development and control of laboratory experiments |
| TRW Systems Group Redondo Beach, California | O (1/65) | S | Bunker-Ramo 340 | Culler-Fried System for Mathematical Analysis | 4 Consoles [11] | 16K | DR (48K Wds.) MT | 4 | Highly flexible system for on-line manipulation, specification and execution of mathematical and symbolic operations with graphical display of results |
| Stanford University Stanford, California | O (6/64) | G | IBM-7090 PDP-1 | MACRO [12] LISP FORTRAN | PHILCO (12) TT (8) | 20K | DK DR | 20 | |
| System Development Corp. Santa Monica, California | O (1/64) | G | AN/FSQ-32 [13] PDP-1 | TINT IPL-TS JOVIAL LISP | TT-28 (6) TT-33 (22) TY (3) CRT (6) | 68K (48K) 16K Buffer | 3 DR (136K Wds.) DK (4M Wds.) MT (16 Units) | 30 | Oriented to command and control experimentation and other general uses |
| U.C.L.A. Western Data Pocessing Center Los Angeles, California | O (11/64) | S | IBM-7740 [14] IBM-7040/ 7094 | | IBM-1050 (12) | 32K | DK DR | 12 | Jointly financed by UCLA and IBM, system services UCLA and 88 other California schools |
| University of California Berkeley, California | D (12/65) | G | SDS-930 PDP-5 | FORTRAN ALGOL, LISP SNOBOL | TT-33 (6) CRT, RAND TABLET | 32K (16K) | DR (1.3M Wds.) | 6 | |
| University of California Santa Barbara, California | O (3/65) | S | RW 400 AN/FSQ-27 | Culler-Fried System for Mathematical Analysis | 16 Consoles [11] RAND TABLET | 6K | DR (80K Wds.) DR (500K Wds.) | 16 | Highly flexible system for on-line manipulation, specification and execution of mathematical and symbolic operations with graphical display of results |
| University of Pennsylvania Philadelphia, Penn. | D (6/65) | G | IBM-7040 PDP-5 | MULTI-LANG MAP, ALGOL | TT-35 (4) BR (2) | 32K (24K) | DK | 6 | |

NOTES
1. Development in cooperation with Project MAC, Massachusetts Institute of Technology.
2. Multiple processor time-sharing system.
3. Developed with the Massachusetts General Hospital under contract from the National Institutes of Health.
4. Based upon an earlier 5-station PDP-1 system operational 9/62.
5. Version of the RAND JOSS language.
6. Developed with the cooperation of the General Electric Co.
7. Initially time-shared in 1961 at the M.I.T. Computation Center.
8. Other languages include FAP, SLIP, COGO, SNOBOL, STRESS, GPSS, COMIT and OPL-1.
9. In addition will use same terminals as MAC Phase One.
10. JOSS II is being implemented on a DEC PDP-6.
11. Each console consists of two keyboards and a storage tube display. A camera and plotter are shared among the consoles.
12. Other languages include FAP, GOGOL, and BALGOL.
13. To be replaced by an IBM 360 Model 67 in early 1967.
14. System currently utilizes five computers in addition to central 7740.